

# Evaluation of chemical eggs components in local poultry breeds and development of NIR spectroscopic technique for the prediction of the biochemical composition.

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## Conclusion

These results made possible a complete characterization of eggs from eight indigenous chicken breeds by a chemical and physical point of view. Moreover, the obtained data and analysis through Near-Infrared spectroscopy (NIR) can be used as an innovative approach to predict the chemical composition of eggs from local hens, that could be used as a discriminatory analysis.

## Material and methods

- 50 eggs per breed at 49-50 weeks of age;
- Dry matter analyzed according to the AOAC 20th edition 2016 n. 925.30 (Ch 34 p.2 solids total in eggs);
- Ashes analyzed according to the AOAC 20th edition 2016 n. 920.153;
- Protein fraction analyzed according to the AOAC 20th edition 2016 n. 925.31 (Ch 34 p.2 Nitrogen in eggs Kjeldhal method);
- Lipid fraction analyzed according to the AOAC 20th edition 2016 n. 991.31;
- Samples, both fresh and lyophilized, were analyzed individually in the near infrared via NIRS DS2500 (FOSS);
- WinISI, software was used to develop calibration curves through cross-validation method.

### Prediction accuracy of freeze-dried and fresh egg yolk matrix, respectively

Trait	SEcv	R <sup>2</sup> cv	Trait	SEcv	R <sup>2</sup> cv
Dry matter	0.3096	0.8440	Dry matter	0.6858	0.2095
Moisture	0.3096	0.8440	Moisture	0.6925	0.3021
Ashes	0.2734	0.1048	Ashes	0.1372	0.0790
Protein	0.3382	0.9017	Protein	0.3369	0.6176
Lipid	0.8637	0.7386	Lipid	0.7597	0.5659

### Prediction accuracy of freeze-dried and fresh egg albumen matrix, respectively

Trait	SEcv	R <sup>2</sup> cv	Trait	SEcv	R <sup>2</sup> cv
Dry matter	0.3467	0.9517	Dry matter	0.6117	0.6623
Moisture	0.3467	0.9517	Moisture	0.6117	0.6623
Ashes	0.2532	0.6270	Ashes	0.0504	0.2346
Protein	1.0967	0.4864	Protein	0.5345	0.6040

SEcv, standard error of cross-validation;  
R<sup>2</sup>cv, coefficient of determination of cross-validation

## Acknowledgment

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## Aim

Analyses of the quality eggs traits and development infrared prediction models of Italian local chickens breeds

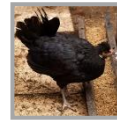
## Breeds



Padovana  
Dorata  
(PPD)



Padovana  
Camosciata  
(PPC)



Polverara  
Bianca  
(PPB)



Polverara  
Nera  
(PPN)



Ermellinata di  
Rovigo  
(PER)



Robusta  
Maculata  
(PRM)



Robusta  
Lionata  
(PRL)



Pepoi  
(PPP)

## Results

Tab.1 - White Shell Eggs: Physical Characteristics on Breed Comparisons

	PPC	PPD	PPN	PPB
Egg weight, g	52.7 <sup>a</sup>	56.3 <sup>a</sup>	49.9 <sup>b</sup>	50.3 <sup>a</sup>
Shell, %	9.41 <sup>b</sup>	9.11 <sup>b</sup>	10.3 <sup>a</sup>	10.3 <sup>a</sup>
Albumen, %	57.9 <sup>a</sup>	56.8 <sup>ab</sup>	55.9 <sup>b</sup>	57.3 <sup>a</sup>
Yolk, %	32.6 <sup>a</sup>	34.0 <sup>a</sup>	33.7 <sup>ab</sup>	32.3 <sup>b</sup>
Yolk/albumen	0.56 <sup>b</sup>	0.60 <sup>a</sup>	0.60 <sup>a</sup>	0.56 <sup>b</sup>
Meat spots, %	1.67	1.67	0	3.33
Blood spots, %	8.33	1.67	1.67	1.67

Tab.2 - Red Shell Eggs: Physical Characteristics on Breed Comparisons

	PER	PRM	PRL	PPP
Egg weight, g	57.7 <sup>a</sup>	60.1 <sup>a</sup>	59.4 <sup>a</sup>	48 <sup>b</sup>
Shell, %	8.44 <sup>a</sup>	9.59 <sup>a</sup>	9.12 <sup>a</sup>	10 <sup>a</sup>
Albumen, %	60.8 <sup>a</sup>	58.1 <sup>a</sup>	61.5 <sup>a</sup>	59.8 <sup>b</sup>
Yolk, %	30.8 <sup>ab</sup>	32.2 <sup>a</sup>	29.4 <sup>a</sup>	30.2 <sup>b</sup>
Yolk/albumen	0.51 <sup>b</sup>	0.56 <sup>a</sup>	0.48 <sup>b</sup>	0.51 <sup>b</sup>
Meat spots, %	5 <sup>a</sup>	32 <sup>b</sup>	35 <sup>a</sup>	17 <sup>b</sup>
Blood spots, %	1.7 <sup>a</sup>	6.7 <sup>b</sup>	3.6 <sup>a</sup>	0 <sup>a</sup>

Tab.3 - White Shell Eggs: Chemical Characteristics on Breed Comparisons

	PPC	PPD	PPN	PPB
Yolk				
Moisture, %	49.4 <sup>b</sup>	50.1 <sup>a</sup>	48.9 <sup>b</sup>	49.0 <sup>b</sup>
Protein, %	16.3 <sup>ab</sup>	16.5 <sup>a</sup>	16.2 <sup>b</sup>	16.6 <sup>a</sup>
Lipid, %	33.0 <sup>ab</sup>	32.1 <sup>a</sup>	33.6 <sup>a</sup>	32.8 <sup>b</sup>
Ashes, %	1.89 <sup>b</sup>	1.77 <sup>ab</sup>	1.67 <sup>b</sup>	1.71 <sup>b</sup>
Albumen				
Moisture, %	88.9 <sup>b</sup>	89.5 <sup>ab</sup>	90.1 <sup>a</sup>	89.6 <sup>ab</sup>
Protein, %	9.33 <sup>b</sup>	8.82 <sup>ab</sup>	8.34 <sup>a</sup>	8.80 <sup>b</sup>
Lipid, %	<0.01	<0.01	<0.01	<0.01
Ashes, %	0.702	0.692	0.669	0.696

Tab.4 - Red Shell Eggs: Chemical Characteristics on Breed Comparisons

	PER	PRM	PRL	PPP
Yolk				
Moisture, %	48.6 <sup>b</sup>	49.1 <sup>b</sup>	48.5 <sup>b</sup>	50.1 <sup>a</sup>
Protein, %	16.2 <sup>b</sup>	15.6 <sup>b</sup>	15.2 <sup>c</sup>	16.1 <sup>a</sup>
Lipid, %	33.5 <sup>b</sup>	34.1 <sup>b</sup>	35.3 <sup>a</sup>	32.7 <sup>c</sup>
Ashes, %	1.74	1.78	1.71	1.84
Albumen				
Moisture, %	89.1	88.9	88.6	88.6
Protein, %	9.25	9.44	9.72	9.73
Lipid, %	<0.01	<0.01	<0.01	<0.01
Ashes, %	0.73 <sup>b</sup>	0.691 <sup>ab</sup>	0.687 <sup>ab</sup>	0.682 <sup>b</sup>

Level of significance: P < 0.05; Statistical analysis: ANOVA and Tukey's test

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